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New record and range extension of the Horned Toad, *Rhinella ceratophrys* (Boulenger, 1882) (Anura: Bufonidae), in Venezuela, and confirmation of its presence in Brazil

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Abstract: The Horned Toad, *Rhinella ceratophrys*, is widely distributed in the northwestern part of the Amazon region. It is known from Venezuela by only a single juvenile from the base of Cerro Marahuaca, Amazonas state. Herein we report four additional specimens from Venezuela: three juveniles also from Cerro Marahuaca, and a subadult female from the southern slopes of Cerro La Neblina, at the southern border of Amazonas state. The specimen from Cerro La Neblina extends the species distribution to the extreme south of Venezuelan Amazonia, 307 km south of Marahuaca, and it represents the southeastern-most record of the species. We also confirm the presence of *R. ceratophrys* in Brazil based on voucher specimens, and present an updated distribution map.

Key words: Amazonas; Amazon Region; Pantepui; Cerro Marahuaca; Cerro La Neblina; geographic distribution; Amphibia

The New World toad genus *Rhinella* Fitzinger, 1826, as currently defined (Chaparro et al. 2007), is among the most diverse bufonid genera (only surpassed by *Atelopus*). It is distributed from southern United States in North America, through Central America southward to Argentina in southernmost South America (Frost 2016). Currently, over ninety species are grouped under this genus (AmphibiaWeb 2016; Frost 2016), nine of which occur in Venezuela: *R. ceratophrys* (Boulenger, 1882), *R. horribilis* (Wieggman, 1833), *R. humboldti* (Gallardo, 1965), *R. margaritifera* (Laurenti, 1768), *R. marina* (Linnaeus, 1758), *R. merianae* (Gallardo, 1965), *R. nattereri* (Bokermman, 1967), *R. sclerocephala* (Mijares-Urrutia & Arends, 2001), and *R. sternosignata* (Günther, 1859) (Barrio-Amorós et al. 2009; Acevedo et al. 2016).

Rhinella ceratophrys is the most striking and easily distinguishable species in the genus. It is mainly characterized by a conspicuous triangular dermal flap laterally projected over each eyelid, but also by having projecting dermal flaps at the corners of the mouth (Figures 1, 4, 7–8), and a large adult size that can reach up to 105 mm SVL (Fenolio et al. 2012). This species is widely distributed in the lowlands and uplands of the northwestern part of the Amazon region (Fenolio et al. 2012), and has been reported from Brazil (La Marca et al. 2004; Segalla et al. 2014), Colombia (Ruiz-Carranza et al. 1996; Acosta & Cuentas 2016), Ecuador (Ortiz et al. 2014), Peru (Rodríguez & Duellman 1994; Fenolio et al. 2012), and Venezuela (Rivero 1961; La Marca 1992; Barrio 1999) (Figure 9). The only specimen known from Venezuela is a juvenile (UPR-M 253; 12 mm SVL), found in Temiche (ca. 1,234 m), at the base of Cerro Marahuaca in Amazonas state (Rivero 1961). Barrio (1999) doubted the identity of this record and supposed that Rivero's specimen could be a misidentified *R. margaritifera*, although he maintained the name of *R. ceratophrys* in all of his subsequent lists of Venezuelan amphibians (Barrio 1999, 2004; Barrio-Amorós et al. 2009). Recently, Fenolio et al. (2012) examined the specimen UPR-M 253 and confirmed that the identification of Rivero (1961) was correct, which ended the recent controversy about the presence of *R. ceratophrys* in Venezuela. No other specimen has been recorded in Venezuela.

The occurrence of *Rhinella ceratophrys* in Brazil has also been controversial. La Marca et al. (2004) indicated the



Figures 1–6. Specimens of *Rhinella ceratophrys* from Venezuela. **1–3.** EBRG 6262 (immature female; SVL: 49.1 mm) from Camp VII, Cerro La Neblina. **4–6.** EBRG 6274 (juvenile; SVL: 26.9 mm) from atop of Cerro Marahuaca. Photos: FJMRR.



Figure 7–8. Specimens of *Rhinella ceratophrys* from Pico da Neblina National Park, Brazil, in life. **7.** INPA-H 15746 (adult female; SVL: 67.6 mm). **8.** INPA-H 15747 (adult female; SVL: 63.6 mm). Photos: VTC.

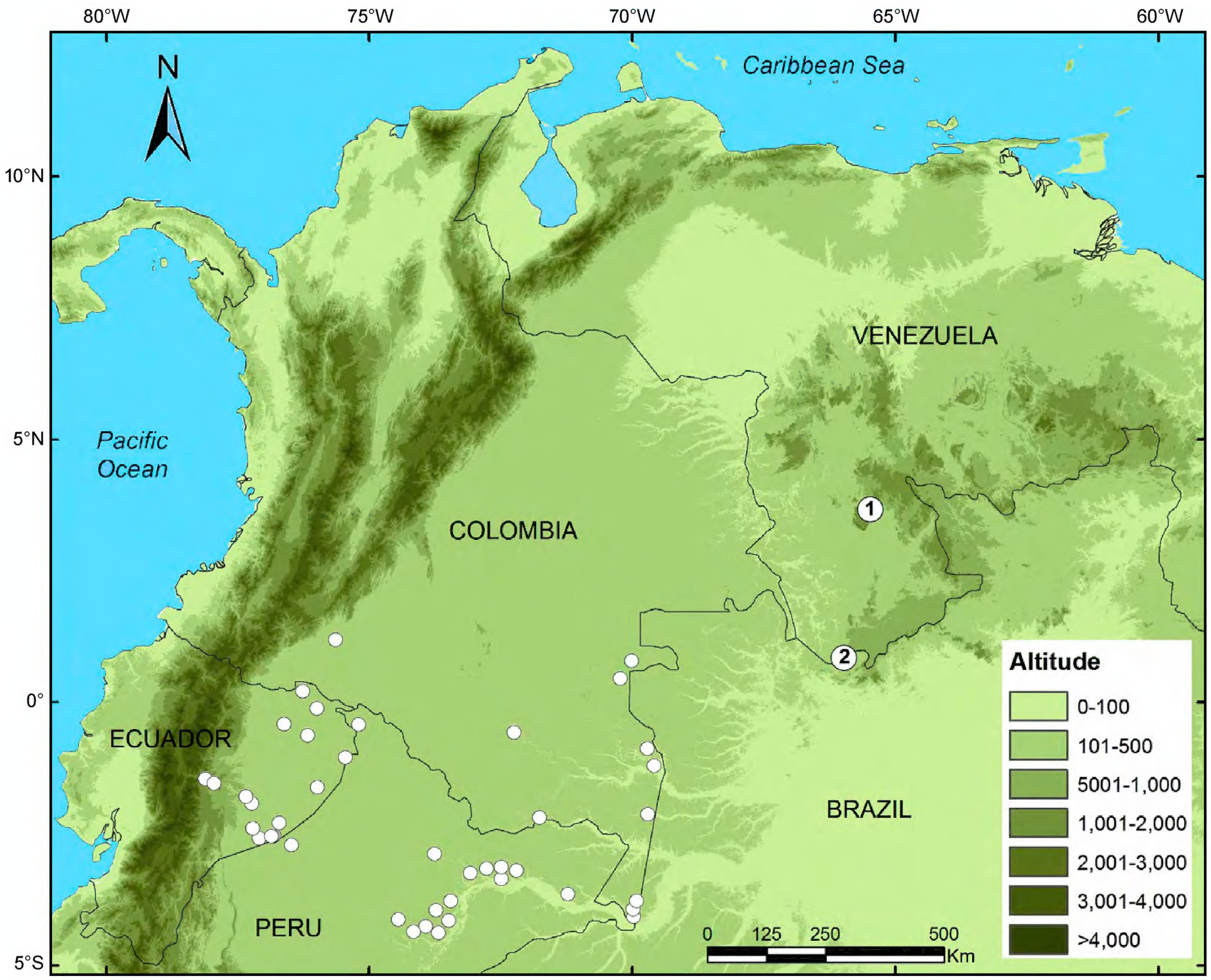


Figure 9. Map of northern South America showing the distribution of *Rhinella ceratophrys*. Solid white circles: localities referred in the literature (Rivero 1961; Fenolio et al. 2012; Acosta & Cuentas 2016; Ron et al. 2016). Numbered circles: (1) includes all localities recorded from Cerro Marahuaca, Venezuela; (2) includes the new Venezuelan record (Camp VII, Cerro La Neblina, Amazonas state, 1,989 m) and all Brazilian localities at Neblina reported in this note. Datum WGS84.

presence of the species in Brazil, but did not provide information on localities nor voucher specimens. Subsequently, Fenolio et al. (2012) stated that the eastern limits of the geographic range of *Rhinella ceratophrys* "undoubtedly" reach the northwestern part of Brazil, but admitted that they were unaware of any records from this region. More recently, Segalla et al. (2014), IUCN SSC-ASG (2015) and Frost (2016) stated that the species occurs in Brazil, but also without providing supporting data. Therefore, voucher specimens of *R. ceratophrys* from Brazil have not been formally reported until now.

A review of amphibians deposited in two Venezuelan collections revealed the existence of additional specimens of *Rhinella ceratophrys* from that country. The authors verified that all the specimens were correctly identified, but curiously none of them had been reported in literature. Two specimens (Figures 1–6), originally deposited in the vertebrate collection of the Museo del Instituto de Zoología Agrícola, Maracay, Venezuela (MIZA-UCV) were recently incorporated within the herpetological collection at the Museo de la Estación Biológica de Rancho Grande, Maracay, Venezuela (EBRG). The first specimen is an immature female (EBRG 6262 [ex MIZA-UCV 14-031]; 49.1 mm SVL; Figures 1–3) from Camp VII, Cerro La Neblina, Río Negro municipality, Amazonas state (0.844444° N, –65.969444° W; 1,989 m [geographic coordinates obtained from Brewer-Carías 1988; elevation obtained from Google Earth]; Figure 9), collected by Eduardo Osuna on 18 November 1984. The habitat in Camp VII was dominated by blocks of sandstone covered with a dwarf forest less than 3 m high, consisting of *Bonnetia* and *Tyleria* shrubs, and an *Euterpe* palm, with an understory of bromeliads (*Brocchinia tatei*) and carnivorous plants (*Utricularia humboldtii*) (Brewer-Carías 1988).

The second specimen is a juvenile (EBRG 6274 [ex MIZA-UCV 14-074]; 26.9 mm SVL; Figures 4–6) from the summit of the central massif of Cerro Marahuaca, Duida-Marahuaca National Park, Alto Orinoco municipality, Amazonas

state, Venezuela (3.666667° N, –65.383333° W; 2,713 m [geographic coordinates obtained from MICHELANGELI et al. 1988; elevation obtained from Google Earth]; Figure 9), collected by Carlos Andara Nieto, on 6 March 1985.

Two other specimens were found in the Colección de Anfibios y Reptiles del Laboratorio de Biogeografía de la Universidad de Los Andes (ULABG), in Mérida, Venezuela: ULABG 4566 (field number PR 213; juvenile female; 28.2 mm SVL) and ULABG 4567 (field number PR 214; juvenile male; 27.8 mm SVL), both from nearby base camp at 1,225 m in Caño Yameduaka, southwest of the northern plateau of Cerro Marahuaca (3.633344° N, –65.479063° W), collected by María José Praderio, on 3 February 1992. The specimen ULABG 4566 was found walking over leaf litter at 13:10 h, near a narrow stream in a densely forested area, with mosses covering trunks, roots, rocks and river banks. The locality was mainly covered by Araceae plants, fallen trunks, and trees with abundant roots and many cavities, all covered by mosses (M.J. Praderio, field notes, 1992). The specimen ULABG 4567 was found at 13:30 h on the ground, near a stream (M.J. Praderio, field notes, 1992). Forests on Cerro Marahuaca between 800 and 1,500 m are medium evergreen montane forests (HUBER 1995).

Additionally, we obtained information about the specimens of *Rhinella ceratophrys* on which were based the Brazilian records of LA MARCA et al. (2004) and SEGALLA et al. (2014). These are five specimens deposited in the Museu Paraense Emilio Goeldi (MPEG 5943–5947), and two additional specimens deposited in the herpetological section of the zoological collections of the Instituto Nacional de Pesquisas da Amazônia (INPA-H 15746–15747). All of them from Pico da Neblina National Park, São Gabriel da Cachoeira municipality, Amazonas state, Brazil: MPEG 5943–5944 (camp at the base of Serra do Tucano; ca. 0.762064°, –65.995720°; 1,200 m), MPEG 5945–5946 (Serra do Tucano, at the plateau of Pico da Neblina; ca. 0.770269° –66.010631°; 1,800 m), and MEPG 5947 (Boca Rica camp, Cuiabixi river; ca. 0.698261° –65.928320°; 412 m), collected by J.B.F. Silva on 09–15 November 1992; INPA-H 15746–15747 (adult females; SVL 67.6 mm and 63.6 mm respectively; Figures 7–8), from Serra da Neblina (0.787428° N –65.999639° W; 1,600 m), collected by V.T. de Carvalho and L. Bonora on 19 August 2005.

Although the specimens from Venezuela reported here are not adults (verified through dissection and gonadal inspection), all of them match the morphological definition of *Rinella ceratophrys* as proposed by FENOLIO et al. (2012). The specimens have the two main species diagnostic characters: a conspicuous triangular dermal flap projected over each eyelid, and projected dermal flaps at the mouth corners (FENOLIO et al. 2012). Such characters are exclusive to *R. ceratophrys*, which makes a misidentification unlikely.

The four specimens from Venezuela reported here represent the first records of *Rhinella ceratophrys* from this country 55 years after RIVERO's study (1961). However, the specimens were collected 25–30 years ago. The specimen EBRG 6262 from Cerro La Neblina extends the known distribution ca. 307 km S from the locality previously reported in Venezuela (Temiche, Cerro Marahuaca), and it represent the southeasternmost locality record for this species. The elevational distribution of *R. ceratophrys* is also extended here to 2,713 m based on the specimen EBRG 6274, which was found in the summit of the central massif of Cerro Marahuaca. The previous record for Venezuela (Temiche) came from 1,234 m, whereas all localities outside Venezuela are below 2,000 m (ORTIZ et al. 2014; COLOMA 2015; this study).

The specimens on which the records of *Rhinella ceratophrys* for Brazil were based (LA MARCA et al. 2004, SEGALLA et al. 2014), were found at elevations between ca. 400–1,800 m at Serra da Neblina. Nonetheless, considering the species' occurrence in the lowlands of the Colombia-Brazil border (departments of Amazonas and Vaupés; LYNCH 2005; ACOSTA & CUENTAS 2016), it is very likely that *R. ceratophrys* occurs in the lowlands (below 400 m) of northern Brazil. All the localities where the species was found in Brazil are between seven km SW and 17 km S from the Venezuelan record at Neblina. These localities are also among the southeasternmost in the distribution of *R. ceratophrys* (Figure 9).

Given that the type locality of *Rhinella ceratophrys* is on the Amazonian versant of the Ecuadorian Andes, about 1,400 km (straight line) from the locality where the species was found in Venezuela, RIVERO (1961) highlighted the possibility that Guianan and Andean-Amazonian populations correspond to different taxa. Furthermore, FENOLIO et al. (2012) have suggested that, as in other widespread Amazonian anurans, it is likely that *Rhinella ceratophrys* represents a complex of morphologically cryptic species. New studies, including molecular evidence, will be required in order to detect possible genetic species-level diversity, and to accurately assess the taxonomic status of the eastern populations of Amazonian horned toads.

Finally, the finding of specimens of unreported species in natural history museums and biological collections, unidentified, hidden under incorrect names or inclusive, as in this case, well identified, highlights the valuable contribution of the collections as sources of information to improve the knowledge of the amphibian species diversity and their distribution patterns.

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